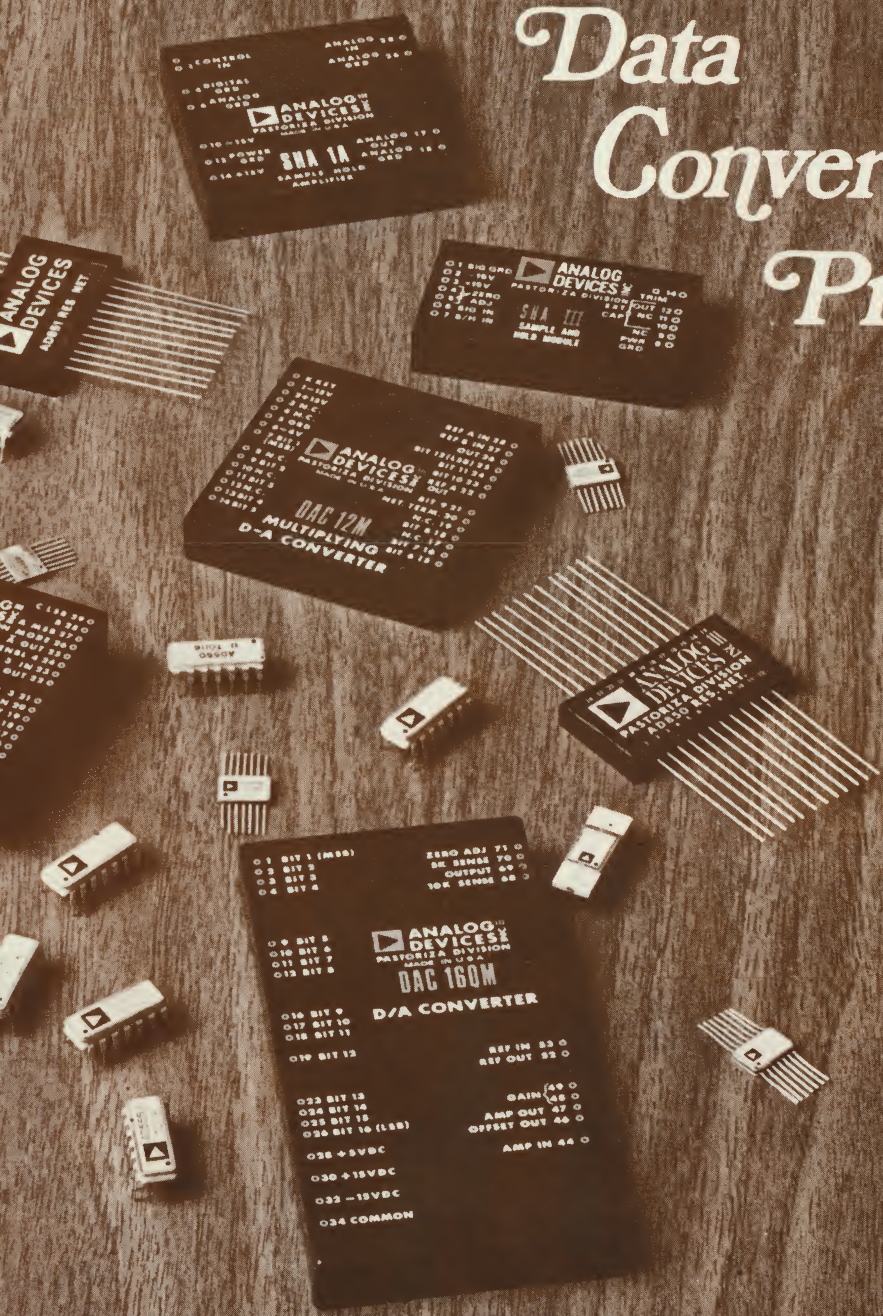
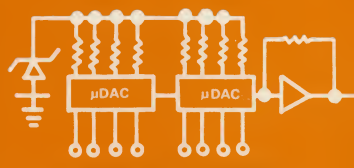
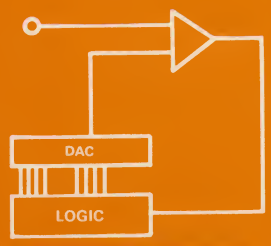
Data Conversion Products



ANALOG DEVICES
Circuit Specialists

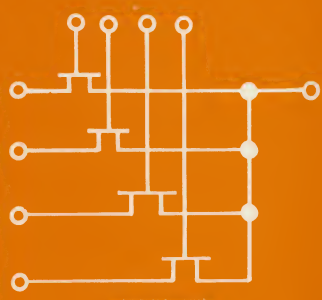


DIGITAL/ANALOG CONVERTERS

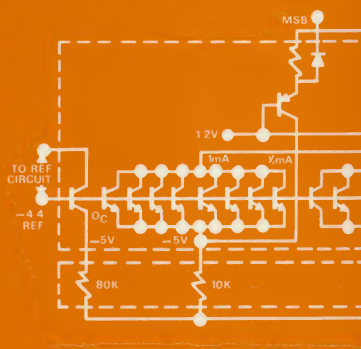


ANALOG/DIGITAL CONVERTERS

SAMPLE/HOLD AMPLIFIERS



MULTIPLEXERS



µDAC SWITCHES AND RESISTOR NETWORKS

CONVERTER ACCESSORY MODULES

MOSFET MULTIPLEXERS

Analog Devices' Multiplexers utilize MOSFET switches, assuring optimum speed and minimal loss of signal accuracy. Address control logic of the MPX-8A is extremely versatile: each unit may be used in single-ended or differential mode; expansion to 64-channel differential requires no additional external logic.

Model	No. Channels	Addressing	Settling Time	Input Range	Power Requirement	Outline Dimensions (Inches)	Price (1–9)
MOSES-8	8	Single-point	100ns	±10V	+15V @ 10mA -28V @ 10mA	4.5x2.25x0.35 card	$320.
MPX-8A[1]	8	Binary-coded	< 2μs	±10V	+15V @ 7mA -15V @ 5mA +5V @ 100mA	2x2x0.4 module	$175.

NOTE:

1. MPX-8A has logic internal for expansion to 64 channels.

SAMPLE AND HOLDS

Analog Devices offers a number of Sample-Hold Amplifiers, with accuracy and timing characteristics chosen to provide a model suitable for each of the most popular applications. Each is designed to provide ½LSB relative system accuracy at the converter resolution for which it was designed.

Model	Linearity	Input Impedance	Acquisition Time	Aperture Time[1]	Settling Time[2]	Slew Rate	Droop Rate	Voltage Range and Output Current	Outline Dimensions (Inches)	Price (1–9)
SHA I	0.01%	—	3μs	400ns	2μs	—	1mV/ms	±5V @ 10mA	4.5x2.5x0.6	$225.
SHA II	0.1%	—	200ns	40ns	1μs	50V/μs	1mV/ms	±5V @ 10mA	4.5x2.5x0.6	$350.
SHA III	0.01%	$10^8\Omega$	130μs	300ns	10μs	0.5V/μs	10μV/ms	±10V @ 10mA	1.125x2x0.4	$95.
SHA IV[3]	0.01%	$10^8\Omega$	130μs	300ns	10μs	0.5V/μs	10μV/ms	±10V @ 10mA	1.125x2x0.4	$120.
SHA IA	0.01%	$10^{12}\Omega$	5μs	40ns	200ns	4V/μs	50μV/ms	±10V @ 20mA	2x2x0.4	$150.
SHA IIA	— — TO BE ANNOUNCED – – – – – COMPATIBLE WITH 1μs 10-BIT CONVERTERS — — —									

NOTES:

1. Aperture time is defined as time from 'HOLD' command to release of the sampling switch.
2. Settling time specified is for switching from Sample mode to Hold. Switching from Hold to Sample settling times are 100μs for the SHA III and 20μs for the SHA IV.
3. SHA-IV switching transients 20mV typ., 50mV max.

MODULAR POWER SUPPLIES

From Analog Devices' selection of over 20 standard power supplies, these particular models are well suited to supplying the power requirements for most conversion system products. A complete power supply catalog is available.

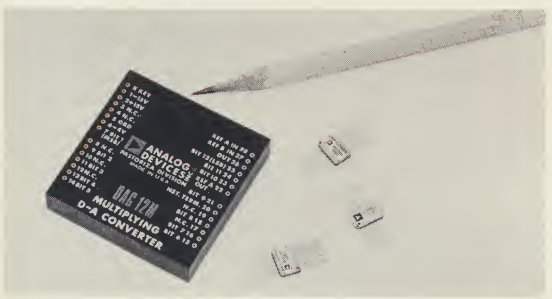
Model	Output	Line Regulation	Load Regulation	TC	Price (1–9)
MPD15/100A	±15V @ 100mA	0.005%	0.02%	0.015%/°C	$149.
MPD15/300A	±15V @ 300mA	0.005%	0.02%	0.015%/°C	$275.
MPD5-150A	+5V @ 600mA ±150V @ 5mA	0.005%	12.5mV	0.05%/°C	$149.
MPD5/750A	+5V @ 750mA	0.005%	12.5mV	0.05%/°C	$149.
904	±15V @ 50mA	0.1%	0.1%	.03%/°C	$39.

ANALOG TO DIGITAL CONVERTERS

Analog-to-Digital Converters made by Analog Devices are designed for high quality and performance at moderate cost. Many models utilize ADI's μDAC ™ quad switches in order to optimize performance over wide temperature excursions. Conservative ratings, as well as use of components with highest available quality, guarantees that ADI converters will assist the user in holding system accuracy for extended periods.

- All are fast, successive approximation types
- All have ±½LSB (max) linearity
- All are monotonic
- All have internal reference
- All have DTL/TTL compatible logic
- All operate from standard power sources of ±15V and +5V

DIGITAL TO ANALOG CONVERTERS



Digital-to-Analog Converters made by Analog Devices are designed to provide the user with the utmost in performance for moderate cost. Components of the highest available quality assure maintenance of system performance for the life of the system.

- All models have ±½LSB (max) linearity
- Multiplying and Fixed Reference types
- All are DTL/TTL compatible
- Settling time to 40ns
- Resolution and linearity to 16 bits (.0015%)
- Fixed reference types have internal reference
- Multiplying types are true 4-quadrant
- Models with and without input registers
- Models with "Deglitchers"

A/D CONVERTERS

KEY FEATURES	MODEL	RESOLUTION	RELATIVE ACCURACY	CONVERSION TIME
GENERAL PURPOSE ECONOMY	ADC-8H	8-Bits	±0.2%	12μs
	ADC-10H	10-Bits	±0.05%	18μs
LOW COST/HIGH PERFORMANCE RATIO	ADC-8Q	8-Bits	±0.2%	16μs
	ADC-10Q	10-Bits	±0.05%	25μs
	ADC-12Q	12-Bits	±0.0125%	25μs
	ADC-8QM	8-Bits	±0.2%	18μs
	ADC-10QM	10-Bits	±0.05%	25μs
	ADC-12QM	12-Bits	±0.0125%	25μs
FAST	ADC-8U	8-Bits	±0.2%	4μs
	ADC-10U	10-Bits	±0.05%	6μs
	ADC-12U	12-Bits	±0.0125%	10μs
ULTRA-FAST	ADC-8F	8-Bits	±0.2%	0.8μs
	ADC-10F	10-Bits	±0.05%	1.0μs

D/A CONVERTERS

KEY FEATURES	MODEL	RESOLUTION	LINEARITY	INPUT CODE OPTIONS[1] (TTL/DTL COMPATIBLE)
GENERAL PURPOSE-ECONOMY	MDA-8H	8-Bits	0.2%	BIN, OBN
	MDA-10H	10-Bits	0.05%	
	DAC-8H	8-Bits	0.2%	BIN, OBN
	DAC-10H	10-Bits	0.05%	
LOW COST/HIGH PERFORMANCE RATIO	DAC-8Q [9]	8-Bits	0.2%	BIN, C-B, OBN, COB, 2SC, C2C, BCD
	DAC-10Q [9]	10-Bits	0.05%	
	DAC-12Q [9]	12-Bits	0.0125%	
	DAC-8QS	8-Bits	0.2%	C-B, CBD
	DAC-10QS	10-Bits	0.05%	
	DAC-12QS	12-Bits	0.0125%	
	DAC-8QM	8-Bits	0.2%	BIN, 2SC, BCD
	DAC-10QM	10-Bits	0.05%	
	DAC-12QM	12-Bits	0.0125%	
SMALL SIZE	MDA-8U	8-Bits	0.2%	BIN, BCD
	MDA-10U	10-Bits	0.05%	
	MDA-12U	12-Bits	0.0125%	
	MDA-8L	8-Bits	0.2%	BIN, BCD
	MDA-10L	10-Bits	0.05%	
	MDA-12L	12-Bits	0.0125%	
4 QUADRANT MULTIPLY-ING DAC	DAC-8M	8-Bits	0.2%	BIN
	DAC-12M	12-Bits	0.02%	
ULTRA-FAST	MDA-8F	8-Bits	0.2%	BIN, OBN
	MDA-10F	10-Bits	0.05%	
HIGH RESOLUTION	DAC-14QM	14-Bits	0.003%	C-B, CBD
	DAC-16QM	16-Bits	0.0015%	
	DAC-14QG	14-Bits	0.003%	Note 4
	DAC-16QG	16-Bits	0.0015%	
CRT DISPLAY	DAC-10D	10-Bits	0.05%	BIN, 2SC

NOTES:

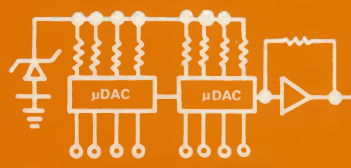
1. Logic Codes:
   BIN — binary
   C-B — comp. binary
   OBN — offset binary
   BCD — binary coded decimal
   COB — comp. offset binary
   2SC — two's complement
   C2C — comp. two's complement
   CBD — comp. BCD
   ADI Convention: Positive True is Normal.
2. MDA series are current output DAC's allowing user to select an op amp of his choice. DAC series are voltage output DAC's with an internal op amp included.
3. DAC-M series input reference voltages are ±10V.

	OUTPUT CODE OPTIONS[1] (TTL/DTL Compatible)	ANALOG INPUT OPTIONS	STABILITY[7] GAIN TC	STABILITY[7] PSRR	POWER REQUIREMENT	PACKAGE SIZE	PRICE (1–9)
	BIN, OBN, 2SC BIN, BCD, OBN, 2SC	+5V, +10V, −10V, ±5V, ±10V	±50ppm/°C ±40ppm/°C	±150ppm/%	+15V @ 40mA −15V @ 30mA +5V @ 350mA	2" x 4" x 0.4" module	$195. $225.
	BIN, BCD, OBN, 2SC	±5V, ±10V, +10V	±5ppm/°C	±20ppm/%	+15V @ 25mA −15V @ 35mA +5V @ 300mA	4.5" x 3.75" card	$250. $280. $305.
	BIN, BCD, OBN, 2SC	±5V, ±10V, +10V	±5ppm/°C	±20ppm/%	+15V @ 25mA −15V @ 35mA +5V @ 200mA	2" x 4" x 0.4" module	$250. $280. $305.
	BIN, OBN	+5V, +10V	±20ppm/°C	±500ppm/%	+15V @ 35mA −15V @ 20mA +5V @ 300mA	4.5" x 3.625" card	$495. $725. $775.
	BIN, OBN	+10V[8]	±50ppm/°C	±1500ppm/%	±15V @ 50mA +5V @ 100mA	4.6" x 2.3" x 1" card	$1,680. $1,990.

	OUTPUT OPTIONS[2]	SETTLING TIME TO % OF FS	STABILITY[7] GAIN TC	STABILITY[7] PSRR	POWER REQUIREMENT	PACKAGE SIZE	PRICE (1–9)
	±1mA or +2mA	300ns to 0.05%	±50ppm/°C	±3ppm/%	±15V @ 20mA	2" x 2" x 0.4" module	$66. $70.
	±5V, ±10V or −10V @ 5mA	25μs to 0.05%	±50ppm/°C	±3ppm/%	±15V @ 25mA		$68. $75.
	+5V, +10V, ±5V or ±10V @ 10mA	2.5μs option 50μs to 0.01% standard	±7ppm/°C	±20ppm/%	+15V @ 25mA −15V @ 20mA +5V @ 150mA with register +5V @ 25mA without register	4.5" x 3.75" card	$135. $165. $185.
	User Programmable to ±2.5V @ 10mA ±5V @ 10mA ±10V @ 5mA +5V @ 10mA +10V @ 5mA	5μs to 0.01%	±7ppm/°C	±20ppm/%		2" x 2" x 0.4" module	$140. $170. $190.
		5μs to 0.01%	±7ppm/°C	±20ppm/%		2" x 4" x 0.4" module	$170. $210. $230.
	Binary +5mA BCD +3mA	200ns to 0.05%	±20ppm/°C	±500ppm/%	+15V @ 25mA −15V @ 15mA	.75" x .75" x 1.5" module	$195. $230. $250.
	Binary +2mA BCD +1.25mA	200ns to 0.05%	±20ppm/°C	±400ppm/%		2" x 2" x 0.4" module	$140. $165. $195.
	±10V @ 5mA[3]	10μs to 0.2% 15μs to 0.01%	±25ppm/°C ±5ppm/°C	±15ppm/%	+15V @ 17mA −15V @ 20mA	2" x 2" x 0.4" module	$195. $295.
	−4.7mA or ±2.3mA	40ns to 0.05%	±10ppm/°C	±100ppm/%[6]	±15V @ 60mA	2" x 4" x 0.4" module	$220. $240.
	User Programmable, see Note 5		±7ppm/°C	±20ppm/%	+15V @ 20mA −15V @ 30mA +5V @ 40mA	2" x 4" x 0.4" module	$395. $745.
	±5V, ±10V, +10V @ 10mA	11μs to 0.003% 13μs to 0.0015%	±7ppm/°C	±20ppm/%	+15V @ 35mA −15V @ 50mA +5V @ 220mA	4.75" x 4.5" card	$590. $890.
	±2.5V @ 15mA ±5V @ 15mA	500ns to 0.05% 200ns for 1 LSB change	±50ppm/°C	±200ppm/%	+15V @ 80mA −15V @ 60mA +5V @ 130mA	4.5" x 6" card	$700.

4. DAC-14/16QG input code options with input registers: Binary, two's complement, BCD, Sign-plus-Magnitude Binary and Sign-plus-Magnitude BCD. The DAC-QG is a manifold board accepting any DAC-QM from 8-bits to 16-bits. The required offset and gain potentiometers are mounted on the board. Options include a "deglitcher", highly versatile input registers, and a choice of output amplifiers.
5. DAC-14/16QM output is user programmable for either current or voltage output. Current output may be −2mA or ±1mA with settling time of 3μs to 0.0015%. Voltage output may be ±5V, ±10V or +10V with settling time of 250μs to 0.0015%. When mounted on the DAC-QG board, output amplifier options allow settling times to 10μs.
6. MDA-F series stability with unipolar output: TC = 25ppm/°C, PSRR = 200ppm/%.
7. Standard operating temperature range on all converters is 0°C to +70°C with storage temperature from −55°C to +125°C. Extended operating range of −55°C to +125°C is available at extra cost on most models by adding suffix "ET" to model number.
8. ADC-F series is available with 5V input and bipolar input ranges on special order.
9. Versions available with input registers.

Analog Devices.... Conversion Products

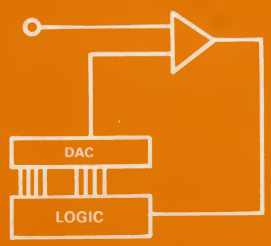


DIGITAL/ANALOG CONVERTERS

The data conversion products described in this brochure are used as the means of converting signals from analog to digital form, and from digital to analog form. Among the most popular uses are:

- Acquisition of analog signals and conversion to digital, for computer entry or logging of data.
- Distribution of analog signals produced by computer-controlled D/A converters.
- Conversion of resolver and synchro signals to digital format for computer processing.
- Communication of analog signals by digital modes, i.e. to allow economy by time-sharing transmission facilities.

The fields of application are widespread and continuously evolving. In fields as diverse as avionics and chemical process control, data communications and scientific research, patient monitoring and microfilming – ADI conversion products are being used for fast economical conversion of data from analog to digital, and back.



ANALOG/DIGITAL CONVERTERS

ANALOG DEVICES is the only company in the data conversion products field to control every phase of product design and manufacture, from the chip or substrate to the module, card, or system. All of Analog Devices' products, from the lowest in cost to the highest in accuracy and performance, are covered by the same warranty, and are guaranteed to meet their complete performance specifications. Any data sheet, or a complete catalog set, is available to you on request.

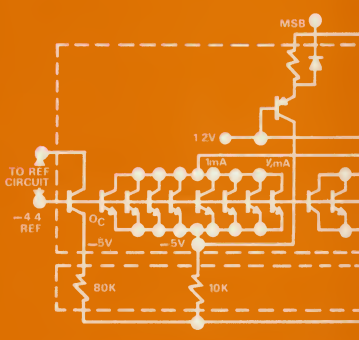

SAMPLE/HOLD AMPLIFIERS

ANALOG DEVICES has an impressive number of industry "firsts" to its credit:

- First to develop and manufacture A/D and D/A converters in encapsulated module form – the MINIDAC®
- First to build a true 16-bit binary D/A converter – the DAC-16QM
- First to develop and market monolithic current switches with 12-bit D/A capability – the µDAC™
- First to develop and market a truly self-contained monolithic analog multiplier – the Model AD530
- First to develop and market a complete monolithic instrumentation amplifier – the Model AD520


MULTIPLEXERS

ANALOG DEVICES has delivered many thousands of Data Conversion Products to military and industrial customers. When you discuss your application with us, whether it requires a standard product or a unique variation, you can be assured that your requirement will be handled by an integrated engineering and manufacturing team that is unmatched in the industry.



µDAC SWITCHES AND RESISTOR NETWORKS

From Silicon to Circuit to System...TOTAL CAPABILITY

ANALOG DEVICES is the only company in the data-systems field that controls every phase of design and manufacturing, from the chip or substrate to the complete system module.

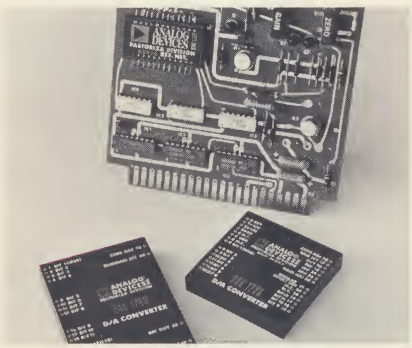
As circuit specialists, we are able to design layouts that create optimum IC's . . . IC's that create optimum circuits . . . circuits that create optimum systems.

As suppliers to most of the manufacturers in the data systems field, we are supplying everything from basic IC's in chip form to complete sub-systems.

μDAC™ FOURTH GENERATION MONOLITHIC SWITCHES AND RESISTOR NETWORKS

Our R & D programs have fully exploited the unique capabilities of the integrated circuit domain. The reliability, uniformity, and economy; and the amenability to mass-production. Closely-matched quad switches, together with compatible precision thin-film resistor networks, provide up to 16-bit DAC performance. For complete information, send for our μDAC ™ brochure.

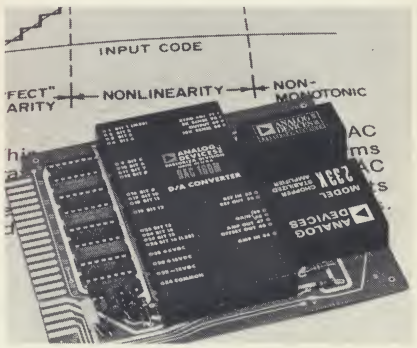
CIRCUIT PACKAGES– MODULES AND CARDS



Over 40 standard D/A's and A/D's form the nucleus of an extensive family of standard data conversion products. In addition, Analog Devices offers all the other devices usually required in the construction of data interface systems:

- Multiplexers
- Sample-Hold Amplifiers
- Power Supplies
- Instrumentation Amplifiers
- Active Filters

SYSTEMS . . . FROM CARDS TO CAGES



Our standard product lines include a complete array of card-mounted assemblies – D/A and A/D converters, multiplexers, comparators, active filters, power supplies, amplifiers of every description – covering both the digital and analog domains. From these alone, or supplemented by auxiliary custom modules, we can provide system capability to match the most demanding specifications.

ANALOG DEVICES
Circuit Specialists

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